NEW MEXICAN CALLIMOMIDAE (CHALCIDOIDEA).

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In the fall and winter of 1931, Dr. Alfred C. Kinsey of Indiana University conducted the Indiana University Mexican Expedition into the western and central parts of Mexico. During the four months in these regions, he and the other members of the party collected many bushels of cynipid galls from various species of oak trees. These were returned to Indiana University, put in copper wire bags, and placed in window boxes. Some time later, the adults emerged in the bags under out-of-door conditions.

During the fall and winter of 1935, the Second Indiana University Mexican Expedition was organized. Again conducted by Dr. Kinsey, this group collected *Cynipidae* in the eastern and central parts of Mexico, and eventually went into Guatemala. The writer was fortunate in being a member of this second expedition.

Both these field trips were financed from three sources: the National Research Council, Indiana University, and by Dr. Kinsey personally.

As the collected *Cynipidae* emerged within the copper wire bags, many families of parasitic insects likewise came from the galls. It is upon some of the *Callimomidae* thus obtained, that this paper is based.

This family as well as some of the other families of the Chalcidoidea is rather difficult to work with taxonomically. The writer believes, however, that the accuracy of classification within the *Callimomidae* in many cases would be considerably increased if more types of data were employed. Morphological characteristics are undoubtedly important in taxonomic work, but it has been demonstrated in other groups that additional data can be effectively used. The greater the variety of characteristics that are taken into consideration, the less likely is one to be deceived by parallelisms and convergences.

[1] Thanks are due to Dr. Alfred C. Kinsey of Indiana University who has supplied me with much of this material, determined the cynipid hosts of these parasites, and who made possible a field trip into Mexico and Guatemala. The nomenclature of the cynipid hosts is supplied by Dr. Kinsey, and it includes some manuscript names, which, in all cases are to be credited to Dr. Kinsey as the author.

The writer believes that at least two other lines of approach in addition to morphology, should be employed in dealing with the species of this family. Distribution and host relationships should be taken into consideration in all cases. While it is true that many species of *Callimomidae* may not be limited to one species of host, the possibility that some host restriction does exist, should be considered. Most careful work is necessary to determine whether host relationships will accord with such taxonomic interpretations of the host as Dr. Kinsey has made upon the *Cynipidae*.

It also seems probable that individual variation should be emphasized in specific descriptions, more than it has been in the past.

Since only a few species of *Callimomidae* are known from Mexico, it is only natural that in some cases the writer has not been able to determine the relatives of these new species. It is hoped, however, that as more material is collected and studied, it will be possible to fit the present species into their natural position in the family.

This is the first of a series of papers that the author hopes to write, dealing with Mexican and Guatemalan *Callimomidae*.

Callimome cognata n. sp.

Female: Length 4.1 mm to 5 mm, average about 4.8 mm. Average length of ovipositor about 5.4 mm.

Scapes of *antennae* yellow to testaceous, rest of antennae black except pedicel, which sometimes has a greenish tinge. Ring joint very small, sometimes difficult to see. Segments longer than broad. Club only slightly longer than preceding antennal segment, joints of club difficult to define.

Face greenish bronze to nearly all bronzy. Eyes reddish. A conspicuous ridge between the bases of the scapes, extending to the margin of the mouth, although sometimes not as noticeable below middle of face. Face sparsely punctate ventrally, striate dorsally.

Dorsal portion of *thorax* bronzy with regions showing greenish in certain lights. The anterior portion is distinctly greenish in some specimens. Thoracic dorsum rugose, becoming rugoso-punctate posteriorly and on the scutellum. Posterior margin of scutellum with a distinct ridge, the ridge usually green. Mesepimeron usually possesses a purplish tint. No cross furrow on the scutellum, although in some lights an indication of a fused furrow may be seen in some specimens.

Metanotum somewhat carinate, with a series of depressions on the anterior margin.

A series of depressions on the anterior margin of the *propodeum.* On the anterior margin of the propodeum, in the mid-dorsal line, a carina is present which extends posteriorly, and divides into three or more branches.

First *abdominal* tergites deeply incised in the mid-dorsal line. Color of abdomen bronzy with a greenish tint in some regions. Sometimes with a wine-colored or purplish splotch dorsally.

Fore and middle *coxae* greenish, hind coxae green ventrally, bronze to brassy dorsally. Femora usually greenish medially on outer surface, tipped with, or gradually fading into testaceous or rufous distally. Usually with a small rufous area proximally. Rufous on the under surface. Ventral margin of femora somewhat denticulate. Tibiae testaceous to rufous. Tarsi densely pubescent, yellowish, tipped with black. Distal portion of segments and under surface sometimes darker.

Posterior tibial *spurs* less than one-half the length of the first tarsal segment. Middle tibial spurs somewhat longer than the posterior spurs.

Stigmal *vein* subsessile. Post marginal vein about twice the length of the stigmal.

MALE: Differs from the female in sexual characters and the following: Average length about 3.2 mm. Appearance of most specimens distinctly more greenish. Face occasionally wholly bluish green with a slight coppery tinge. Dorsal portion of thorax sometimes almost wholly green, with coppery iridescence. Posterior portion of thorax not as distinctly rugoso-punctate. Abdomen with more green in some specimens. Hind coxae not as distinctly bicolored in most cases. Femora usually almost wholly greenish. Tibiae sometimes partly or wholly greenish or piceous.

HOST: *Andricus* (*ruginosus*) *nimietas* (Kinsey MS.) (Kinsey det.).

TYPE LOCALITY: 15 miles west of Patos, Durango, Mexico.

TYPES: 30 Females and 11 males. Holotype and paratypes in the author's collection. Paratype females in the United States National Museum. Labeled: Patos, 15W., Dgo., 8500 feet, Mex., 11.11.31, Female, Male, spring '32. *Q. striatula,* Kinsey coll. ex. gall of *A.* (*rug.*) *nimietas,* Kinsey det.

This species according to published description, seems to be somewhat related to *Callimome mexicanum* Ashmead. The latter,

collected from Guanajuato, Mexico, was reared from galls of *Andricus* (*rhizoxenus*) *championi* (Ashmead 1899). *Callimome cognata,* however, differs from *C. mexicanum* as follows: The ovipositor in *Callimome cognata* is comparatively shorter than in *C. mexicanum.* The legs are differently colored in the two species. There is a V-shaped carina in both species, but in *C. cognata* additional carinae connect to the V. The scutellar furrow is not well defined in *Callimome cognata.*

Dr. Kinsey states that the two cynipid hosts of these two species of parasites belong to complexes which are related. The callimomid species, therefore, possess physiological as well as morphological connections. The type localities of the two species are close enough together so that relationship would not be excluded on distributional grounds.

According to Huber (1927) there are specimens of *Callimome mexicanum* in the National Museum from Guanajuato, Mexico, the type locality, and also additional specimens determined by him from Williams, Arizona. This latter locality record while not impossible, might be questioned, since *Callimome cognata,* a related species lies between these two localities.

Callimome nubila n. sp.

FEMALE: Length 3 mm to 3.6 mm. average about 3.4. Average length of ovipositor 2.6.

Scapes of *antennae* yellow on outside surface, blackish on surface next to face, and on distal end. Pedicel, and sometimes ring joint green, rest of antennae black. Segments much longer than broad, the segments being hard to define distally.

Face bright green to greenish blue, sometimes purplish or iridescent. Facial carina hard to define.

Thorax bright green to brilliant blue green, sometimes with purplish regions, usually with brassy markings in various regions. Thoracic dorsum pubescent, hairs longer toward the posterior portions of the scutellum. No sign of a scutellar furrow. Usually a distinct brassy or golden region on the lateral portion of the metanotum, lateral portion of the scutellum, and posterior region of the axillae.

Abdomen green to greenish blue or purple, sometimes with brassy markings. On the dorsal surface, a rather large bronzy splotch medially. First tergites incised in the mid-dorsal line, the first tergite not completely overlapping the second.

Coxae green, tipped with light yellow. A rather noticeable

depression present on the lateral region of the hind coxae. Rest of front and middle legs light yellow, tarsi usually tipped with brown. The hind legs except coxae, are yellow except that the femora are tipped with brown, while the tibiae are yellow proximally, fading into light brownish distally. The hind tarsi are tipped with brown. The hind tibial spurs are about one-half the length of the first tarsal segment.

Stigmal *vein* usually petiolate. Wings with a stigmal cloud, which varies considerably. Sometimes it is hardly visible, while in other specimens it is rather dense.

MALE: Differs from the female in sexual features, and the following: Average length about 2.5 mm. Scapes green, sometimes slightly brownish at the ends. Antennal segments subquadrate distally. Elongate hairs on scutellum sparse to absent in some specimens. Abdomen darker than in the female, sometimes nearly all bronzy. Cloud in wing usually not as noticeable as in female.

HOST: *Biorhiza* (*pulchripennis*) *stelis* Kinsey. (Kinsey det.).

TYPE LOCALITY: 7 miles north of Pachuca, Hidalgo, Mexico.

TYPES: 35 females, and 18 males. Holotype and paratypes in the author's collection. Paratype females in the United States National Museum. Labeled: Pachuca, Hgo., 7N, 8700 feet, Mex., 1.15.32, female male spring 32. *Q. rhodophlebia,* Kinsey coll. ex. gall of *Bior.* (*pul.*) *stelis,* Kinsey det.

It has so far not been possible to positively determine any near relative of this species. The published description of *Callimome rudbeckiae* Ashmead somewhat resembles this species, but before anything can be definitely determined, the types must be compared. *Callimome rudbeckiae* was reared from a gall on *Rudbeckia,* species. There does not therefore appear to be any host connection between the two species.

Callimome denticulata n. sp.

FEMALE: Length 2 mm to 2.5 mm, average length about 2.2 mm. Average length of ovipositor about 1.5.

Scapes of *antennae* green with a brassy tinge, tipped with brown proximally. Pedicel and ring joint green, rest of antennae black. Segments longer than broad. In some specimens, there is the appearance of a ring around the central portion of the segments.

Face green, usually with a brassy or coppery tinge in various regions. Lower portion of face feebly punctate, the punctations being large but very shallow. Dorsal portion of head

very thin anterio-posteriorly. A distinct purple region next to the outer eye margin.

Thorax strongly arched. The dorsal surface green or greenish blue, usually with a brassy or coppery tint. Sometimes with rather large, wholly copper colored areas. Surface with sparse, rather large, but shallow, depressions which are usually deeper, and which may form definite punctations on the anterior part of the scutellum. Scutellar furrow definite in most specimens. Surface posterior to the furrow free of punctations.

Propodeum relatively smooth except for a large depression on each side of the mid-dorsal line.

Abdomen green to bluish green dorsally, sometimes with a brassy tinge. A coppery splotch is present on the dorsal surface medially. Ventrally, green to coppery in some specimens. First tergites incised in the mid-dorsal line.

Coxae and femora greenish, in many cases with a brassy or coppery tinge, although sometimes almost wholly brown. Legs usually brown at the joints. Hind coxae usually distinctly bronzy or brassy dorsally. Tibiae mostly green, but sometimes tipped with brown, or nearly all bronzy. Tarsi yellowish tipped with black. Longest hind tibial spur about one-half the length of the first tarsal segment.

Hind femora denticulate with usually a small but distinct *tooth* present distally. Sometimes only a dentiform angle is present.

No stigmal cloud in *wings* except as noted later. Stigmal vein subsessile to petiolate, the post-marginal vein usually not quite twice the length of the stigmal.

MALE: Differs from the female in sexual characteristics, and the following: Average length about 1.7 mm. Thorax usually not so strongly arched, and the thoracic depressions not as noticeable as in the female. The color of the thorax and abdomen is darker in a few specimens.

HOST: *Feron* (*crystallinum*) *tostum* Kinsey (Kinsey det.)

TYPE LOCALITY: 30 miles west of Namiquipa, Chihuahua, Mexico.

TYPES: 70 females and 45 males. Holotype and paratypes in the author's collection. Paratype females in the United States National Museum. Labeled: Namiquipa, Chi., 30 W., 5200 feet, Mex., 10.18.31, female male 7.1.32. *Q. chihuahuensis,* Kinsey coll. ex. gall of *Feron* (*crys.*) *tostum,* Kinsey det.

There are many specimens in this series in which the antennae or other parts of the body are somewhat broken. Since, however, such a large series was studied, a composite description was easily made.

This species was placed in the genus *Callimome* despite the presence of a definite tooth on the hind femora in most specimens. As has been mentioned previously (Breland MS) it seems that decidedly too much emphasis has been placed on the presence or absence of a tooth on the hind femora, to separate this genus from *Diomorus*. Despite the presence of this tooth, this species is a true *Callimome*. The tooth character, therefore, unsupported by other characteristics, fails in some cases to separate the genera *Callimome* and *Diomorus*.

It has so far been impossible to determine with certainty any near relative of this species. Two other species of *Callimome* have been described that possess a tooth on the hind femur: *Callimome fullawayi* Huber, and *Callimome texanum* Hoffmeyer. These species, according to published descriptions, resemble *Callimome denticulata* in a few points, but since there is such a difference in others, I do not believe these insects are related. In a final analysis, however, it will be necessary to compare the actual types.

In studying over the specimens in this series, a rather interesting thing was discovered. As indicated in the above description, the wings of this insect do not possess a stigmal cloud. Several female specimens were discovered, however, that did possess a stigmal cloud in their wings. In addition, the body color was usually somewhat darker than in the other specimens. The other characteristics of these specimens came within the range of the individual variation of the species. Because of the small number of insects exhibiting these characteristics, the author was not able to interpret this phenomenon entirely to his satisfaction. He believes, however, that these specimens possibly represent mutant individuals, which have as yet not had the time or chance to extend these characteristics to the other members of the species. At any rate, because of the bare possibility that these specimens might represent another but closely related species, these insects were not included in the type series.

Callimome crassa n. sp.

FEMALE: Length 2.8 mm to 4 mm. Average length about 3.5 mm. Average length of ovipositor about 3.7 mm.

Scapes of *antennae* usually light rufous, darker at the distal tip. Pedicel bronze to greenish, rest of antennae black. Seg-

ments longer than broad. (Club broken off in all specimens.)

Lower part of *face* coppery to purple, sometimes greenish just above base of mandibles. Usually replaced by green sometimes with a brassy tinge dorsally.

Dorsal portion of *thorax* green to brassy or bronzy, the green specimens with a brassy to coppery tint. Only a faint indication of a fused cross furrow on the scutellum. Surface finely punctate, with indications of larger shallower punctations. Other sutures easily distinguishable. Part of the meso-sternum, lower portion of mesepisternum, and sometimes prepectus, blue to purple. Usually not as much purple present as in the next species.

On the anterior margin of the *propodeum,* on each side of the mid-dorsal line, a row of depressions is present. The lateral depressions are sometimes larger than those closer to the mid-dorsal line.

Anterior *abdominal* tergites incised in the mid-dorsal line. The posterior tergites are comparatively thick, so that the segmentation is easily distinguished. Dorsal anterior portion of abdomen green, with a purplish bronze splotch near the center. Sometimes coppery posteriorly. Green dorso-laterally, fading into copper color ventrally. Rarely most of the abdomen with a golden tinge.

Hairs on abdominal surface sparse and not conspicuous.

Front *coxae* greenish, middle coxae greenish or bronzy, hind coxae green ventrally, bronzy purple dorsally. Femora green, sometimes with a coppery tinge on the outer margin, sometimes bronzy. Coppery on the inner margin. Fore and middle femora tipped with yellow to light rufous, the posterior femora tipped with light rufous. Tibiae light rufous to piceous, sometimes with a greenish tinge; the posterior tibae usually slightly darker than the middle and fore. Tarsi yellowish tipped with black. Sometimes slightly darker at the joints. Hairs on under surface sometimes darker.

Stigmal *vein* short, sessile. Post marginal usually at least twice the length of the stigmal. No indication of a stigmal cloud.

Male: Differs from the female in sexual features, and the following: Average length about 2.5 mm. Distal antennal segments more sub-quadrate than in female. The antennal club is present in some male specimens, and is about one and one half times the length of the preceeding antennal segment. Scapes of antennae nearly all green or greenish blue in most

cases. Facial carina sometimes more prominent. Tibiae darker in most specimens. Head, thorax, and abdomen sometimes darker bronze in color.

HOST: *Cynips* (*dugèsi*) *emergens* Kinsey (Kinsey det.).

TYPE LOCALITY: 20 miles east of Pacheco, Chihuahua, Mexico.

TYPES: 12 females and 4 males. Holotype and paratypes in the author's collection. Labeled: Pacheco, 20 E.Chi., 10.11.31, Mex., 5400 feet, female male 7.10.32. *Q. sacame,* Kinsey coll. ex. gall of *C.* (*dugèsi*) *emergens.*

It has so far not been possible to determine with certainty any relative of these insects among described species of *Callimomidae.* As indicated later, however, this species is closely related to the following.

Callimome nuda n. sp.

FEMALE: Length 3 mm to 4 mm. Average length about 3.5 mm. Average length of ovipositor 3.9.

Scapes of *antennae* light rufous, dorsal portion tipped with black. Pedicel green, rest of antenna black. Segments longer than wide. (Club broken from all specimens.) Ring joint very short.

Dorsal portion of *face* bluish to green. Mid-portion somewhat bronzy, usually greenish just above bases of mandibles. Facial carina fairly prominent between bases of scapes, and in some cases to be traced to the bases of the mandibles. It is, however, less noticeable on the lower part of the face.

Dorsal portion of *thorax* green with a coppery to brassy tint. Surface with small punctations, with indications of larger shallower depressions. An indication of a fused scutellar furrow in most specimens. Lower part of mesepisternum, portion of mesosternum, prepectus, and sometimes other parts of the mesopleuron, blue to brilliant purple. Usually more purple present than in the preceeding species.

On each side of the mid-dorsal line, on the anterior margin of the *propodeum,* a series of rather large depressions, which extend a little over one-half the distance to the spiracle.

First *abdominal* tergites incised in the mid-dorsal line. Color of abdomen dark green to bluish green basally. A definite bronzy splotch present in the mid-region dorsally. Rest of abdominal surface dark green, with an undertone of brown in various regions in some specimens. Green laterally, grading into bronze toward the ventral surface. Only a few sparse hairs present. Tergites comparatively thick, so that the segmentation is easily distinguished.

Coxae greenish, the dorsal portion of the posterior ones being bronzy. Femora green, usually with a bronzy tinge, and in some cases tipped with rufous distally. No teeth present on the hind femora. Fore and middle tibiae variable. Sometimes wholly rufous or wholly greenish piceous. At other times greenish piceous tipped with rufous. Posterior tibiae greenish piceous medially, sometimes lighter at each end. Tarsi yellow tipped with black.

Stigmal *vein* sessile. Post marginal two to three times as long as the stigmal. No evidence of a stigmal cloud.

MALE: Differs from the female in sexual characteristics, and the following: Average length 2.5 mm. Antennal scapes dark green to piceous, sometimes lighter proximally. Tibiae never wholly rufous. Postmarginal vein slightly shorter than in female. Thorax sometimes with more blue or bluish green than in female.

HOST: *Cynips* (*dugèsi*) *oriens* Kinsey. (Kinsey det.).

TYPE LOCALITY: 7 miles southeast of Miquihuana, Tamaulipas, Mexico.

TYPES: 8 female and 4 male specimens. Holotype and paratypes in the author's collection. Labeled: Miquihuana, Tams., 7 SE, 6000 feet, Mex., 11.15.35, female male 11.19.35. *Q. sacame,* Kinsey coll. ex. gall. of *C.* (*dugèsi*) *oriens,* Kinsey det.

Although it has not been possible to determine any previously described relative of *Callimome nuda,* it is definitely related to the preceding species, *Callimome crassa.* A glance at the specific description, will indicate the morphological similarity. In addition, these two species parasitize two closely related species of host insects. The type localities are not too far apart to preclude relationship on distributional grounds. These two species, however, differ in a number of points, the following of which seem to be the most evident:

The facial carina is in many cases more prominent in *Callimome nuda.* The dorsal region of the head and face in *Callimome nuda* is usually distinctly bluish in certain regions, while in *Callimome crassa* it is green with a distinct brassy tinge, never bluish. *Callimome nuda* possesses in most cases considerably more purple on the lateral portion of the thorax. The basal dorsal portion of the abdomen in *Callimome crassa* is green, while in *Callimome nuda* it is greenish blue to purple. The hind tibiae are usually somewhat darker in color in *Callimome nuda.* Most of the males of *Callimome nuda* possess considerably more blue or bluish green

color on various parts of their body than the males of *Callimome crassa.*

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